FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Andrew John Friedman
James E. Bruya, Ph.D.
(206) 285-8282

3008-B 16th Avenue West
Seattle, WA 98119
FAX: (206) 283-5044

April 23, 1993

Gerry Thompson, Project Leader
Alaskan Copper Works
628 South Hanford
Seattle, WA 98134

Dear Mr. Thompson:

Enclosed are the results from the testing of material submitted on April 19, 1993 from Project 7238, Hydroxide Barrell Analysis, PO #M28562.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

Bradley T. Benson
Chemist

BTB/dp

Enclosures

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: April 23, 1993
Date Received: April 19, 1993
Project: 7238, Hydroxide Barrell Analysis, PO #M28562

RESULTS FROM THE ANALYSIS OF THE LIQUID SAMPLE FOR FINGERPRINT CHARACTERIZATION BY INDUCTIVELY COUPLED PLASMA (ICP) EMISSION SPECTRSOCOPY

Sample #	ICP Characterization
M28562	The ICP emission spectroscopy trace showed the presence of the following metals at the approximate level indicated.

Aluminum (<1 ppm)
Antimony (<1 ppm)
Arsenic (<1 ppm)
Barium (1 ppm)
Berylium (<1 ppm)
Boron (9 ppm)
Cadmium (<1 ppm)
Calcium (<1 ppm)
Chromium (24 ppm)
Cobalt (<1 ppm)
Copper (20 ppm)
Gold (<1 ppm)
Iron (8 ppm)
Lead (<1 ppm)
Lithium (<1 ppm)
Magnesium (<1 ppm)
Manganese (3 ppm)
Mercury (<1 ppm)
Molybdenum (<1 ppm)
Nickel (280 ppm)
Palladium (<1 ppm)
Phosphorous (<1 ppm)
Platinum (<1 ppm)
Potassium (<1 ppm)
Rhenium (<1 ppm)
Selenium (<1 ppm)
Silicon (3 ppm)
Silver (<1 ppm)
Sodium (31,000 ppm)
Strontium (<1 ppm)
Thallium (ppm)
Tin (<1 ppm)
Titanium (<1 ppm)
Uranium (<1 ppm)
Vanadium (<1 ppm)
Yttrium (<1 ppm)
Zinc (<1 ppm)

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: April 23, 1993
Date Received: April 19, 1993
Project: 7238, Hydroxide Barrell Analysis, PO #M28562

RESULTS FROM THE ANALYSIS OF THE DIGESTION OF PRECIPITATE SAMPLE FOR FINGERPRINT CHARACTERIZATION BY INDUCTIVELY COUPLED PLASMA (ICP) EMISSION SPECTRSOCOPY

Sample #	ICP Characterization
M28562	The ICP emission spectroscopy trace showed the presence of the following metals at the approximate level indicated.

Aluminum (<1 ppm)
Antimony (<1 ppm)
Arsenic (<1 ppm)
Barium (40 ppm)
Berylium (<1 ppm)
Boron (<1 ppm)
Cadmium (<1 ppm)
Calcium (<1 ppm)
Chromium (300 ppm)
Cobalt (<1 ppm)
Copper (30 ppm)
Gold (<1 ppm)
Iron (20,000 ppm)
Lead (<1 ppm)
Lithium (<1 ppm)
Magnesium (<1 ppm)
Manganese (70 ppm)
Mercury (<1 ppm)
Molybdenum (<1 ppm)
Nickel (14,000 ppm)
Palladium (<1 ppm)
Phosphorous (<1 ppm)
Platinum (<1 ppm)
Potassium (<1 ppm)
Rhenium (<1 ppm)
Selenium (<1 ppm)
Silicon (<1 ppm)
Silver (<1 ppm)
Sodium (<1 ppm)
Strontium (<1 ppm)
Thallium (ppm)
Tin (<1 ppm)
Titanium (<1 ppm)
Uranium (<1 ppm)
Vanadium (<1 ppm)
Yttrium (<1 ppm)
Zinc (<1 ppm)

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: April 23, 1993
Date Received: April 19, 1993
Project: 7238, Hydroxide Barrell Analysis, PO #M28562

RESULTS FROM THE ANALYSIS OF THE DIGESTION PRECIPITATE SAMPLE FOR FINGERPRINT CHARACTERIZATION BY INDUCTIVELY COUPLED PLASMA (ICP) EMISSION SPECTRSOCOPY

Sample #	ICP Characterization
M28562	The major portion of the black precipitate did not dissolve in HF. The precipitate is most likely carbon. The metals in the precipitate indicate the steel drum that is holding the sodium hydroxide solution may be solubilizing somewhat, but the presence of high levels of carbon suggest the addition of an organic liquid such as an oil.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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RESULTS FROM THE ANALYSIS OF THE PRECIPITATE SAMPLE FOR SPOT TESTS OF SOLUBILITY

Results Reported as Positive/Negative

Sample #	Solubility
Nitric acid	Negative
Hydrochloric acid	Negative
Hydrofluoric acid	Partial
Methylene chloride	Negative
Carbon tetrachloride	Negative
Hexane	Negative

Microscopic examination: A fine black and brown amorphous substance.

Not soluble in organic solvents and most inorganic acids. Sample (precipitate) indicative of carbon.

4.~~APP~~.A
4.19.93
10:30

FRIEDMAN & BRUYA, INC.
3008-B 16th Avenue West
Seattle, WA 98119

SAMPLE CHAIN OF CUSTODY

Send Report To:
Company Alaskan Copper Works Contact Gerald Thompson
Address 628 Harbord ST
City, State, Zip Seattle WA
Phone # (206) 623-5800 Date 4-19-93

SITE NO.	PROJECT NAME	PURCHASE ORDER #
7238.	Hydroxide Bennell Analysis	M 28562

SAMPLERS (signature)	PROJECT LOCATION
	3200 6th Ave

REMARKS	SAMPLE DISPOSAL INFORM.
	☐ Dispose after 30 days ☑ Return Samples ☐ Call for Instructions

SAMPLE #	Date/Time Sampled	Type of Sample	# of Jars	Lab Sample #	Analyses Requested
M 28562	4/19/93 8:00AM	Soil - Hydroxide	1	39351	Metals Scan
					what is it?
					~~NTE~~ NTE 200$

	SIGNATURE	PRINT NAME	COMPANY	Date	Time
Relinquished by:		Gerald A Thompson	Alaskan Copper	4/19/93	10:30 AM
Received by:		Mark Z Perin	FBE	4/19/93	10:30
Relinquished by:					
Received by:					

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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DUPLICATE COPY

April 23, 1993

INVOICE # 93ACU0423-2

Alaskan Copper Works
628 South Hanford
Seattle, WA 98134

RE: Project 7238, Hydroxide Barrell Analysis, PO #M28562: Results of testing requested by Gerry Thompson, Project Leader and submitted on April 19, 1993.

1 liquid sample characterized by ICP Emission Spectroscopy @ $75 per sample	$ 75.00
1 precipitate sample analyzed for spot tests of solubility @ $100 per sample	100.00
No Charge	(100.00)
1 digestion of precipitate sample characterized by ICP Emission Spectroscopy @ $75 per sample	75.00
Amount Due	$ 150.00